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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/630,411

07/30/2003

Tony Mule

62020-1220

9009

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7590

03/16/2005

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EXAMINER

LEPISTO, RYAN A

ART UNIT

PAPER NUMBER

2883

DATE MAILED: 03/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/630,411

Applicant(s)

MULE ET AL.

Examiner

Ryan Lepisto

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. **Claim 25** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, in particular, this claim recites the limitation "structure substrate." There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 11-18, 25-34, 37 and 38** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ding (US 6,351,576 B1)**.

Ding teaches a device for microelectronic optical clock distribution (abstract) comprising an integrated circuit device (Fig. 2 202), a reflecting cladding (Fig. 2, 260, it reflects light traveling through the core region, implying a lower index of refraction and it surrounds the core region, so it can be defined as a cladding) disposed on the back of the integrated circuit substrate (208), a waveguide (Fig. 3, 264 or Fig. 5, 564 that is shown as structure 222 in Fig. 2) with a light guiding core region (region where beam

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(268) travels) disposed on the P-epi cladding layer (110) wherein the core region (shown in Fig. 5, part of 564, 584) includes a vertical-to-horizontal diffractive metal mirror (DMM) (522) (with as is shown in Fig. 2, a stepped or surface-relief structure) for distributing (and multiplexing) an optical clock signal from a source to a horizontal-to-horizontal DMM (578) for distributing an optical clock signal to two horizontal-to-verticals DMMs (566) for distributing an optical clock signal from a source to revivers (518) (column 9 lines 1-22), a second reflecting cladding (Fig. 2, 262, it reflects light traveling through the core region, implying a lower index of refraction and it surrounds the core region, so it can be defined as a cladding) adjacent to the core region, a chi-level detector (218) on the integrated circuit device (202), a chip-level dielectric via (220) (column 5 lines 8-10), a chip-level optical source (248, from a fiber, not shown, column 8 lines 5-6) and a substrate (implying, printed wiring board) (208).

Ding further teaches the method and means of forming the structure (Fig. 9) comprising providing the substrate (a cladding (210) is a part) (900), disposing the core region on the substrate (cladding (210) included) and the diffractive DMMs (either simultaneously (920) or separately (930 to 910)) wherein the cladding layers (260, 262) are fabricated during metallization (etching is a widely used process) on the core region.

Ding does not teach expressly the term "grating" used to described the diffractive metal mirrors, the first cladding layer (260) being a write-wavelength vertical reflection absorption layer, a horizontal reflection absorption layer adjacent to the core or disposing a vertical reflection absorption layer on the second cladding layer.

Ding does teach wavelength that the DMMs are diffractive, meaning they reflect certain wavelengths of light, as do grating. Ding also teaches that the reflective cladding layers (260, 262 and 236-246) surrounding the core (260 and 262 being horizontal and 236-246 being vertical) (column 4 lines 64-65). Ding teaches that the vertical reflectors (236-246) may be polycrystalline silicon and the horizontal reflectors (260, 262) may be silicides (column 7 lines 18-38).

At the time the invention was made, it would obvious to a person of ordinary skill in the art to assume that these materials could be used as write-wavelength reflection absorption layers since they reflect, but are not "perfect" reflections, implying they will absorb certain signals, even if only very little. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with materials as taught by Ding because the materials as described above will reflect and absorb optical signals and the DMMs have the same functionality as a diffractive "grating".

The motivation would have been to improve thermal properties, reduce size, reduce clock skew and increasing ease of fabrication by using the processes and materials of Ding (Ding, column 11 line 57 through column 12 line 27).

3. **Claims 19-24 and 35-36** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ding as applied to claims 11-18, 25-34, 37 and 38 above, and further in view of **Brophy et al (US 2003/0034538 A1)** (Brophy).

Ding teaches the optical clock distribution device described above with the limitation described above used to reject claims 11-18, 25-34, 37 and 38.

Ding does not teach expressly creating the diffractive (mirrors or gratings) in cladding layers.

Brophy teaches a device for optical clock signals (paragraph 0150) comprising waveguide core layer (Fig. 44, 1206) and cladding layer (1204) adjacent the core including a grating structure (1203) etched in it. Brophy teaches a further embodiment with core (Fig. 45, 1238), a first cladding (1236) and a second cladding (1234) with a grating structure (1233) etched in it.

Ding and Brophy are analogous art because they are from the same field of endeavor, optical clock distribution devices using diffractive elements in or around waveguide core and claddings to route a signal.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to create diffractive elements in cladding layers as is taught by Brophy with it being obvious in the device as taught by Ding to have additional claddings where the diffractive mirrors (or gratings) may be produced, separate the waveguide core region.

The motivation for doing so would have been to be able to tune the indices of refraction of the gratings more easily by being able to use widely used manufacture techniques with cladding regions (Brophy, paragraphs 0172, 0176, 0178-0179)

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. "Input Coupling and Guided-wave Distribution Schemes for Board-level Intra-chip Guided-Wave Optical Clock Distribution Network Using Volume Grating Coupler Technology", Mule et al, Proceedings of the IEEE, June 2001, p. 128-130., Guilfoyle (US 6,690,851 B1) and Guilfoyle et al (US 6,829,286 B1).

Response to Arguments

5. Applicant's arguments with respect to claims 11-37 have been considered but are moot in view of the new ground(s) of rejection.

6. With respect to the argument that a waveguide core is not equivalent to a waveguide layer: when taken with the broadest possible interpretation, the core layer claimed, for example, in claim 11 would read on a waveguide core since, for example, an optical waveguide has a core, which is a layer of optical material (or air) that allows an optical signal to propagate through it.

7. With respect to the inherency argument of claim 16 on page 20 of the arguments, there are no arguments giving a reason for the traversing of the inherency finding. In particular, there are no examples giving of when a detector and source do not have some sort of via for a signal to travel from one to the other through.

8. With respect to the inherency argument of claim 35 on page 41 of the arguments, the examiner does not see an inherency claims in the first action regarding claim 35.

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9. With respect to the inherency argument of claim 36 on page 46 of the arguments, the applicant does not give a reason that given a structure, why it wouldn't be inherent to have a method of fabricating that structure with no limitations on the fabrication technique except for repeating the structure itself and with the word "providing" before each structural element.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Lepisto whose telephone number is (571) 272-1946. The examiner can normally be reached on M-F 7:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ryan Lepisto

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Date: 3/10/05



Frank Font

Supervisory Patent Examiner

Technology Center 2800